by Carolyn De Wilde

n Calendar Year (CY) 1993, a total of 206.4 million tax returns are projected to be filed at Internal Revenue Service (IRS) service centers [1]. This is an increase of 1.6 percent over the number estimated to be filed in CY 1992. Return projections, developed by the IRS Research Division staff, provide a foundation for IRS resource requirements and budget submissions to the Department of Treasury, Office of Management and Budget and Congress. Calendar year projections reflect the year in which the returns are processed rather than the tax year [2]. Additionally, the projections account for recent administrative, regulatory and legislative changes. This article presents highlights of projection methodology, growth rates, projection accuracy and some discussion on the impact of electronic filing on individual returns.

Projection Methodology

Three distinctive methods were used to project tax returns: regression techniques, time series analysis and growth rates. Regression techniques were used when statistically sound relationships existed between tax return filings and independent economic or demographic indicators. The key economic and demographic variables which significantly affected return filings were personal income, gross domestic product (GDP), total employment, total population, the interest prime rate and household net worth [3]. These variables were used in regression

Individual income tax returns account for over 56 percent of all returns expected to be filed in 1993. models to project individual, employment, fiduciary and various corporation returns. In most instances, these economic or demographic variables were lagged by 1 year to correspond with the tax years, not the filing years. Also, "dummy variables" were occasionally used to account for the effects of legislative changes, return count aberrations and other

unusual conditions not reflected by the economic or demographic variables.

The regression models incorporate the actual 1991 return count into the base period. Some also include 1992 estimates in the base period. Typically, the 6-month return count is used to estimate the total for the year based on the proportion of returns filed in 1992 relative to the same period in 1991.

Carolyn De Wilde is an economist with the Projections and Forecasting Group, Research Division. This article was prepared under the direction of Russell Geiman, Group Chief. In the absence of statistically sound relationships with economic and demographic variables, returns were projected using time series analysis: from finite moving averages, exponential smoothing and transfer function models to the more sophisticated autoregressive integrated moving average (ARIMA) technique. For example, for Forms 720 and 730, linear exponential smoothing and linear growth extrapolation, respectively, were used.

Simple growth rates are often used for forecasting when the return series has a short historical base period because the traditional projection techniques are not applicable. This method assumes that a prior growth pattern for a given form will continue in the future, or that a new return type will grow at the same rate as a related established return. Form 8752, filed annually by all partnerships and S Corporations electing either to maintain or establish a taxable year other than the required calendar year is a prime example of a new return projected using the growth rate of another return. In this instance, the combined Form 1065 (partnership) and Form 1120S (S Corporation) growth rate was used to project the Form 8752 volumes.

Projection Highlights

Grand Total Returns, Primary Returns and Supplemental Documents

The projections for the grand total of all returns call for an annual average increase of 1.8 percent for the years 1993 through 1999 (see Figure A). "Primary Returns," particularly individual, corporation and employment tax returns, account for a major portion of the total filings and generate the majority of IRS document processing workload. Of the 206.4 million total returns projected to be filed in 1993, about 195.4 million were designated as Primary Returns and the remaining 11.0 million as "Supplemental Documents" (see Figure B). Supplemental Documents are mainly composed of amended returns and requests for filing extensions from both individuals and corporations [4].

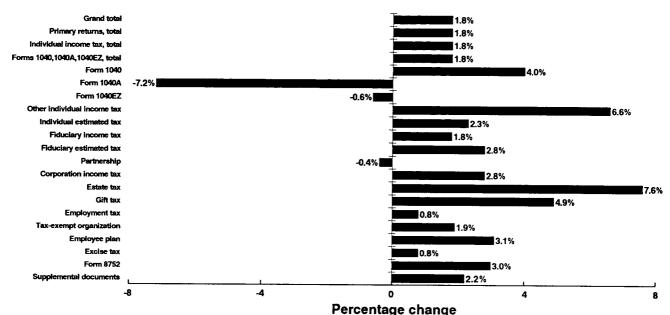
Individual Returns

The total 1040 series (the sum of Forms 1040, 1040A and 1040EZ) comprises the bulk of total individual income tax returns. These returns are expected to reach nearly 117 million by CY 1993. Comparing the year-to-year percentage changes for the total 1040 series, the projections call for an increase of 1.5 percent in 1993 and 1.8 percent in 1994. Through 1999, the average annual growth rate in the series is 1.8 percent.

Individual returns account for over 56 percent of all returns expected to be filed in 1993. The IRS receives individual tax returns in a number of mediums, including

Figure A

Projected Average Annual Percentage Change in the Number of Returns Filed, by Type of Return, Calendar Years 1993-1999



conventional paper returns, electronically-filed returns, and the new Form 1040PC (which is now separately projected). Form 1040PC is a special condensed paper return generated by special tax preparation computer software. The IRS has also tested the filing of Form 1040EZ returns using touch-tone telephones under a new program called TeleFile (see Figure C).

Electronic filing was introduced to the public in 1986. In the first filing season, 25,000 returns were filed electronically in selected test areas in Ohio, North Carolina and Arizona. The program was expanded nationally in 1990 [5]. In 1992, over 11 million returns were electronically filed, which is 9.6 percent of all individual returns. In 1999, projections show that over 21 percent of all individual taxpayers will file electronically. Figure D graphically demonstrates the projected growth of electronically-filed returns in relation to all other individual income tax returns.

The official IRS reporting system counts most individual returns filed electronically (including Form 1040PC and TeleFile) as if they were Form 1040 returns. However, a 1992 analysis of electronically filed returns showed that almost 80 percent could have been filed on either the Form 1040A or the Form 1040EZ. These percentages are based on an analysis which determines the easiest type of paper return the electronic filer was eligible to file. Thus, the present accounting system over-

Figure B

Projections for Calendar Year 1993

[Number of returns is in thousands]

Type of return	1993 Projections	Percentage change from 1992¹ (estimated)		
Grand total	206,406	1.64		
Primary returns, total	195,365	1.61		
Individual income tax, total	117,040	1.50		
Forms 1040, 1040A, 1040EZ, total	116,670	1.49		
Form 1040	81,267	5.03		
Form 1040A	18,592	-9.03		
Form 1040EZ	16,811	-1.94		
Other	370	3.71		
Individual estimated tax	36,801	2.28		
Fiduciary income tax	2,864	0.88		
Fiduciary estimated tax	641	8.24		
Partnership	1,616	-0.55		
Corporation income tax	4,620	2.97		
Estate tax	75	7.71		
Gift tax	181	6.98		
Employment tax	28,799	0.94		
Form 10422	23	0.78		
Tax-exempt organization	555	2.46		
Employee plan	1,228	4.11		
Excise tax	853	0.68		
Form 8752	70	3.52		
Supplemental documents, total	11,040	2.10		
Form 1040X	2,064	0.71		
Form 4868	5,179	2.01		
Form 2688	1,712	4.13		
Form 1120X	22	-5.86		
Form 7004	2,029	2.16		
Form 1041A	35	1.70		

Percentage changes for 1992 were based on estimated final counts of returns because complete information was unavailable at the time this table was compiled.
2 Annual Withholding Tay Betturn CHUS Source leader to Estimate the Country of the Country of

² Annual Withholding Tax Return for U.S. Source Income of Foreign Persons NOTE: Detail may not add to totals because of rounding.

Figure C

Individual Income Tax Returns by Non-Conventional Filing Methods, Calendar Years 1992-1993

[Number of returns is in thousands]

Filing methods	1992 Estimates	1993 Projections			
Electronic filing	11,068	14,755			
TeleFile (in Ohio)	126	168			
Form 1040PC	1,481	6,610			

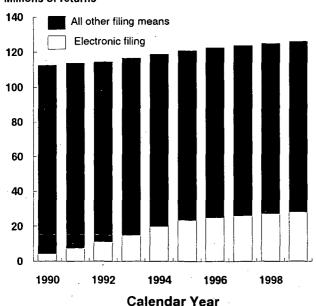
states Form 1040 filings and understates Form 1040A and Form 1040EZ filings. This, in turn, has made it difficult to forecast true underlying filing patterns by individual form type.

In an effort to preserve underlying filing trends for forecasting purposes, IRS Master File data were adjusted to eliminate the effect of electronic filing. Total electronic filing was subtracted from Form 1040 return types and redistributed to Form 1040, 1040A and 1040EZ return types based on the type of form the taxpayer could have filed. The result of this redistribution is the construction of historical filing patterns as if electronic filing never existed. After projections of relevant return items were made, projections of electronic filings on Forms

Figure D

Individual Income Tax Returns Filed Electronically and By Other Means, Calendar Years 1990-1999

Millions of returns



1040, 1040A and 1040EZ were subtracted from projected individual Form 1040, 1040A and 1040EZ return types. Figure E represents the percentage of returns projected to be filed electronically in 1993 by estimated form type eligibility [6].

Individual Declarations of Estimated Tax

The Individual Declaration of Estimated Tax (Form 1040-ES) payment vouchers are filed when income is not subject to withholding (or if the tax withheld is expected to be inadequate). Income not subject to withholding includes income from self-employment, interest, dividends, rents and alimony. Estimated tax payments are usually made on a quarterly basis depending upon the date the income was received. The projections have a growth rate of 2.3 percent in 1993 through 1999. In 1993, about 36.8 million Form 1040-ES vouchers are projected to be filed, about 18 percent of the grand total of all returns. The Form 1040-ES projections are based on a time series model.

Fiduciary Income Tax Returns

Form 1041 is filed by a fiduciary to report the income of an estate or trust. Annual growth for this return type from 1993 to 1999 is expected to average 1.8 percent. This projected growth is more or less in line with the anticipated increase in household net worth (a measure of personal wealth).

Fiduciary Estimated Tax Returns

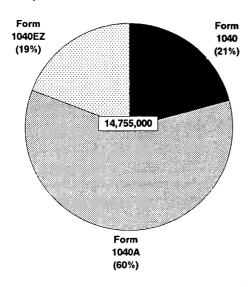
Form 1041-ES was created by the Tax Reform Act of 1986, which mandated that fiduciaries of estates and trusts make certain estimated income tax payments beginning with Tax Year 1987. In 1993, about 640,700 Forms 1041-ES are expected to be filed, with an average annual growth of 2.8 percent projected through 1999. These projections were created by regressing the ratio of Forms 1041-ES to Forms 1041 on the interest prime rate charged by banks.

Partnership Returns

U.S. Partnership Return of Income (Form 1065) is used to report income, deductions, credits and losses from the operation of a partnership. The purpose of this return is to show each partner's distributive share, to be reported on the individual (or other) income tax return. The projections show an overall consistent decline of 0.6 percent through 1996, and then a slower decline of 0.3 percent until 1999. Forecasts have been based on a time trend model for recent years.

Figure E

Estimated Percentage of Individual Income Tax Returns Filed Electronically, by Type of Return, Calendar Year 1993



Corporation Income Tax Returns

Corporation income tax returns are the aggregate of Forms 1120 (U.S. Corporation Income Tax Return); 1120-A (U.S. Short-Form Corporation Income Tax Return); and various other forms filed by such entities as real estate investment trusts, insurance and investment companies, homeowners associations and others. The corporation category also includes tax returns filed by "S Corporations" (Form 1120S, U.S. Income Tax Return for an S Corporation) that are taxed through shareholders. In 1993, about 4.6 million returns are projected to be filed. The projected average annual percentage change in the number of returns through 1999 is 2.8 percent which reflects a combination of econometric regression models using GDP and time series techniques based on past filing experience.

Estate and Gift Tax Returns

Federal estate tax returns (Form 706) are filed to report the transfer of property at death. In 1987, the filing requirement threshold was increased to estates whose gross assets exceeded \$600,000. Estate tax returns are expected to grow at a rate ranging from 7.7 percent in 1993 to 7.4 percent by 1999. The estate tax return total is the summation of the projections for three distinct size groupings of returns: gross assets under \$1 million; between \$1 million and \$5 million; and over \$5 million. The methodologies used for these projections were

ARIMA, exponential smoothing and weighted moving average, respectively.

The Federal gift tax is imposed on the gratuitous transfer of real or personal property which exceeds a certain dollar amount. Generally, the person making the gift (the donor) must file Form 709 to pay the tax. The 1993 projections call for a 7.0 percent growth rate. The average annual growth rate for the period 1993-1999 is projected at 4.9 percent. These projections are based on a time trend based on earlier years.

Employment Tax Returns

Employment tax returns consist of Employer's Annual Federal Unemployment Tax Return (Forms 940 and 940EZ), Employer's Annual/Quarterly Federal Tax Return (Form 941), Employer's Quarterly Tax Return for Household Employees (Form 942), Employer's Annual Tax Return for Agricultural Employees (Form 943) and Employer's Annual Railroad Tax Return (Form CT-1). Overall, employment tax returns are expected to grow at an average rate of 0.8 percent. This sluggish growth largely reflects the forecasted growth pattern for civilian employment. The major contributor to the employment tax return total is Form 941. The 1993 projection figure for Form 941 represents 21.7 million of the total 28.8 million employment tax return total, or approximately 75 percent.

The methodology for the total employment figure is the summation of all of the forms listed above. The regression model for Forms 940, 940EZ, 941 and 941 PR/SS/E used civilian employment lagged by 1 year with the appropriate dummy variables. Forms 942, 943, 943PR and CT-1 were regressed on a time trend. The overall projections were a summation of all the employment forms listed above.

Tax-exempt Organization Returns

Total tax-exempt organization returns are a summation of Form 990, Return of Organization Exempt From Income Tax; Form 990EZ, Return of Organization Exempt from Income Tax (Short Form); Form 990C, Farmers' Cooperative Association Income Tax Return; and Form 990PF, Return of a Public Foundation, as well as Form 990T, for the tax on unrelated business income of exempt organizations, Form 4720, for certain excise taxes on charities and other exempt organizations and Form 5227, filed for split-interest trusts. In 1993, total tax-exempt organization returns are expected to grow 2.5 percent over 1992 to about 555,000 returns. The longer range projections for 1993 through 1999 call for an average annual growth of

1.9 percent. A variety of forecasting methods was used for the five separate return forms. Forms 990, 990EZ, 990PF, 990T, 4720 and 5227 were regressed on a time trend. Forms 990C were regressed on the number of farm cooperatives and a dummy variable.

Employee Plans

Total employee plan returns, representing the sum of Forms 5500, Annual Return/Report of Employee Benefit Plan; 5500C/R, Return/Report of Employee Benefit Plan; and 5500EZ, Annual Return/Report of One-Participant (Owners and their Spouses) Pension Benefit Plan are projected to reach 1.2 million in 1993, increasing to 1.5 million by 1999. The overall average growth rate from 1993 to 1999 is 3.1 percent.

Excise Tax Returns

Total excise tax returns processed by IRS are the sum of the following four categories of returns: (1) Form 11C (Special Tax Return and Application for Registry-Wagering); (2) Form 720 (Quarterly Federal Excise Tax Return); (3) Form 730 (Tax on Wagering); and (4) Form 2290 (Heavy Vehicle Use Tax Return). Form 720 and Form 2290 comprise the largest share of the total. Using the 1993 projected figures, these two forms together represent about 92 percent of total excise tax returns. Form 11C and Form 2290 were regressed on time trends. Form 720 and Form 730 used linear exponential smoothing and linear growth extrapolation, respectively (Alcohol and tobacco tax forms are not processed by IRS and are therefore excluded from these projections.)

Form 8752

Form 8752 is filed annually by all partnerships and S Corporations electing either to maintain or establish any taxable year other than the calendar year required by the Tax Reform Act of 1986. Prior to 1991, Form 8752 was encompassed in the Form 720 volumes. Form 8752 projections were based on the combination of the growth rates of Form 1065 (Partnerships) and Form 1120S (S Corporations). The projected figure for 1993 is approximately 70,000 returns, reflecting a growth rate of 3.5 percent from 1992. In 1999, the number of returns projected is 83,100.

Supplemental Documents

"Supplemental Documents" are comprised primarily of amended returns and requests for filing extensions. In 1993, about 11.0 million supplemental returns are expected to be filed, representing a growth of 2.1 percent from CY 1992 which largely reflects recent growth rates.

Projection Accuracy

In addition to understanding the forecasting models and projected volumes, it is useful to consider the historical accuracy of past projections when evaluating future forecasts. Using the actual return counts for Calendar Years 1989 through 1991, two key measures of accuracy have been calculated -- the mean absolute error (MAE) and the mean absolute percent error (MAPE). The MAE is the average of the relevant "projection errors," regardless of whether the forecasts were overprojected or underprojected. The projection error is simply the actual result minus the projected volume. The MAE and MAPE values are grouped by time horizons. The time horizon is determined by when the forecast was made and for what future year. For example, a forecast for CY 1989 made in 1986 would be part of the "3 years ahead" time horizon. At each time horizon, the number of observations (N) was held constant at three [7]. Figure F shows the MAE and MAPE accuracy rates of projections at the national level.

For the grand total and the primary return total categories, the absolute percentage errors (MAPE's) are generally in the 1 to 2 percent range, regardless of the time

Figure F

Mean Absolute Error (MAE) and Mean Absolute Percentage Error (MAPE) Accuracy of U.S. Level Projections Based on Actual Return Counts for Calendar Years 1989 through 1991

Type of	· M	lean absolute erro	(number of return	ns)	Mean absolute percentage error				
return 1 year ahead	2 years ahead	3 years ahead	4 years ahead	1 year ahèad	2 years ahead	3 years ahead	4 years ahead		
And the second s	. (1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
Grand total	1,773,433	3,586,533	5,958,200	3,959,433	0.88	1.78	2.93	1.94	
Primary returns, total	647,767 140,933	2,106,333 806,167 270,033 112,467	3,549,333 456,800 317,900 144,800	2,652,600 644,000 411,200 154,400	0.94 0.58 8.03 2.39	1.10 0.71 15.80 2.58	1.84 0.40 18.58 3.37	1.38 0.58 23.93 3.59	
Employment tax	324,700	361,967	685,567	901,833	1.13	1.26	2.39	3.15	
Supplemental documents	1,273,233	2,147,633	2,408,933	2,139,067	12.51	20.77	23.24	20.59	

horizon. The total individual return projections have the lowest average MAPE, ranging from 0.4 percent to 0.7 percent. Supplemental documents are historically more volatile and thus more difficult to project, as illustrated by the 12.5 percentage for 1-year-ahead MAPE.

The complete set of projections for 1992 through 1999 by form type is presented in Table 1.

Notes and References

[1] The number of returns filed (as used in this article) represents returns processed at IRS service centers and posted to the Master File system during a calendar year. The IRS Master File system includes the Individual Master File (IMF), the Business Master File (BMF) and the Employee Plans Master File (EPMF).

The numbers do not include the information and withholding documents processed by the Service, such as interest and dividend statements on Forms 1099, and wage and tax statement on Forms W-2. Information and withholding documents contain data for use in the IRS programs that match information return data with what is reported on the income tax return and are not considered to be tax returns. Most information documents are received on magnetic tape and processed at the IRS Martinsburg (West Virginia) Computing Center. For information about information return projections, see Calendar Year Projections of Information and Withholding Documents for the United States and Service Centers: 1992-1999, Revision 4-92, Research Division, Internal Revenue Service, U.S. Department of the Treasury.

[2] All statistics are for the year in which the tax returns were processed by the Internal Revenue Service,

stated on a calendar year basis, unless otherwise noted. The main calendar year projections discussed in this article are based on Calendar Year Return Projections for the United States, Regions, and Service Centers: 1992-1999, Revision 10-92, Research Division, Internal Revenue Service, U.S. Department of the Treasury. Final actual counts for Calendar Year 1992 were incomplete at the time this article was written. For complete, fiscal year counts, see Annual Report of the Commissioner and Chief Counsel, Internal Revenue Service, Fiscal Year1992 (in preparation at the time this article was written).

- [3] Economic and demographic variables were estimated by Data Resources, Incorporated, June 1992.
- [4] See Calendar Year Return Projections for the United States, Regions, and Service Centers: 1992-1999, op. cit., for a further explanation of return types.
- [5] Musselman, Bryan L., "Electronic Filing--Who's Participating and Who Isn't," The IRS Research Bulletin, September 1991, Research Division, Internal Revenue Service, U.S. Department of the Treasury.
- [6] U.S. Department of the Treasury, Internal Revenue Service, Research Division, Calendar Year Projections of Individual Returns By Major Processing Categories, Revision 8-92.
- [7] For further discussion of the issue of projection accuracy, see Calendar Year Projections of Individual Returns By Major Processing Categories, op. cit., and Geiman, Russell R., Nichols, Bonnie L. and De Wilde, Carolyn D., "How Are We Doing? An Analysis of Projection Accuracy," The IRS Research Bulletin, op. cit.

Table 1.--Number of Returns Filed or to be Filed with the Internal Revenue Service, Calendar Years 1991-1999

[Number of returns are in thousands]

Type of	Actual 199†	Estimated 1992 ²	Projected						
return			1993	1994	1995	1996	1997	1998	1999
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Grand total.1	204,264	203,079	206,406	210,088	213,690	217,240	220,859	225,106	229,702
Primary returns, total	193,601	192,265	195,385	198,809	202,160	205,473	208,850	212,812	217,117
Individual income tax, total	114,134	115,316	117,040	119,129	121,094	123,016	124,979	127,508	130,394
Forms 1040, 1040A and 1040EZ, total	113,829	114,959	116,670	118,734	120,672	122,564	124,494	126,989	129,837
Form 1040	74,687	77,378	81,267	86,880	91,336	93,919	96,149	98,699	101,474
Form 1040A	21,785	20,437	18,592	15,753	13,705	13,026	12,630	12,370	11,987
Form 1040EZ	17,358	17,144	16,811	16,101	15,631	15,618	15,716	15,920	16,375
Other 3	305	357	370	395	422	452	484	520	557
Individual estimated tax	38,814	35,980	: 36,801	37,640	38,499	39,377	40,274	41,193	42,13
Fiduciary income tax 4	2,779	2,839	2,864	2,880	2,956	3,016	3,082	3,146	3,20
Fiduciary estimated tax		592	641	659	676	681	690	704	71
		1.625	1,616	1,607	1,598	1,593	1,588	1,584	1,58
Partnership	4,374	4,487	4,620	4,748	4.863	5,001	5,139	5,281	5,42
Estate tax	65	70	75	81	87	94	101	109	113
Gift tax	157	169	181	192	202	212	221	229	23
Employment tax 6	28,465	28,530	28,799	29.081	29,330	29,571	29,806	30,034	30,22
Form 1042. ⁷	22	23	23	23	-23 -	23	24	24	24
Tax-exempt organization 8	520	541	555	567	578	589	599	609	620
Employee plan 9	1,126	1.180	1,228	1,272	1,314	1,352	1,389	1,424	1.45
Excise tax 10	821	847	853	860	866	873	880	887	89-
Form 8752 ¹¹	65	67	70	72	74	76	79	81	8:
		· ·			1				
Supplemental documents, total	10,663	10,814	11,040	11,279	11,531	11,767	12,009	12,294	12,580
Form 1040X ¹²	1,861	2,050	2,064	2,105	2,144	2,182	2,220	2,256	2,29
Form 4868.13	5,144	5,077	5,179	5,267	5,361	5,447	5,534	5,646	5,76
Form 2688.14	1,662	. 1,644	1,712	1,775	1,840	1,902	1,964	2,035	2,10
Form 1120X15	28	23	22	21	20	19	18	17	10
Form 7004.16	1,934	1,986	2,029	2,077	2,129	2,179	2,233	2,299	2,36
Form 1041A.17	34	34	35	35	37	38	40	42	43

¹ Excluded from all totals are the following "Non-Master File" returns: Forms CT-2, 941M, 990BL and 1120-IC-DISC. Also excluded are withholding and information documents, including forms

such as W-2 and the 1099 series and related others.

² Estimate, including that for some corporations, is based on returns processed through part of 1992. The actual number filed in CY 1992 was unavailable when this table was compiled.

³ Includes Forms 1040NR, 1040PR, 1040SS and 1040C; Form 1040X is included under "Supplemental documents," below.

Includes Forms 1040NH, 104DPH, 104DPH,

⁸ Includes Forms 990, 990EZ, 990C, 990PF, 990T, 4720 and 5227.

⁹ Includes Forms 5500, 5500C, 5500EZ and 5500R.

10 Includes Forms 11C, 720, 730 and 2290; excludes Forms 11 and 5000.24 which are filed with the Bureau of Alcohol, Tobacco and Firearms, U.S. Department of the Treasury, instead of with

the Internal Revenue Service.

11 Form 8752 is filed by partnerships and S Corporations electing either to maintain or establish any taxable year other than the required calendar year

¹² Individual amended return.

¹³ Individual request for automatic filing extension.

¹⁴ Individual request for additional filing extension.

¹⁵ Corporation amended return.

¹⁶ Employee benefit plan explanation of required distributions

¹⁷ Trust accumulation of charitable amounts.

NOTE: Detail may not add to totals because of rounding